

CLAIMS

What is claimed is:

1. An aluminum alloy comprising:
approximately 1.0 to 20.0% by weight of a first rare earth element selected from the group consisting of ytterbium and gadolinium;
a plurality of insoluble particles formed of said first rare earth element;
approximately 0.1 to 10.0% by weight of at least one second rare earth element selected from the group consisting of gadolinium, erbium and yttrium if said first rare earth element is ytterbium or the group consisting of ytterbium, erbium and yttrium if said first rare earth element is gadolinium; and
the balance of the aluminum alloy is aluminum.
2. The aluminum alloy as recited in claim 1 further including approximately 1.0 to 15% total by weight of at least one minor alloy element.
3. The aluminum alloy as recited in claim 2 wherein said at least one minor alloy element is selected from the group consisting of copper, zinc, silver, magnesium, manganese, tin, titanium, cobalt and calcium.
4. The aluminum alloy as recited in claim 1 wherein said first rare earth element is ytterbium and said plurality of insoluble particles are formed of said ytterbium
5. The aluminum alloy as recited in claim 4 wherein said at least one second rare earth element is said yttrium.
6. The aluminum alloy as recited in claim 5 including approximately 14.0% to 15% of said ytterbium and approximately 4.0% of said yttrium.

7. The aluminum alloy as recited in claim 1 wherein said first rare earth element is gadolinium and said plurality of insoluble particles are formed of said gadolinium
8. The aluminum alloy as recited in claim 7 wherein said at least one second rare earth element is said yttrium.
9. The aluminum alloy as recited in claim 8 including approximately 13.0 to 16.0% of said gadolinium and approximately 4.0% of said yttrium.

10. A gas turbine engine component comprising:
components of an aluminum alloy including approximately 1.0 to 20.0% of a first rare earth element selected from the group consisting of gadolinium and ytterbium, a plurality of insoluble particles formed of said first rare earth element, approximately .01 to 10.0% by weight of at least one second rare earth element selected from the group consisting of gadolinium, erbium and yttrium if said first rare earth element is ytterbium or the group consisting of ytterbium, erbium and yttrium if said first rare earth element is gadolinium, and the balance of the aluminum alloy is aluminum.
11. The gas turbine engine component as recited in claim 10 further including approximately 1.0 to 15% total by weight of at least one minor alloy element.
12. The gas turbine engine component as recited in claim 11 wherein said at least one minor alloy element is selected from the group consisting of copper, zinc, silver, magnesium, manganese, tin, titanium, cobalt and calcium.
13. The gas turbine engine component as recited in claim 10 wherein said first rare earth element is ytterbium and said plurality of insoluble particles are formed of said ytterbium
14. The gas turbine engine component as recited in claim 13 wherein said at least one second rare earth element is yttrium.
15. The gas turbine engine component as recited in claim 10 wherein said first rare earth element is gadolinium and said plurality of insoluble particles are formed of said gadolinium.
16. The gas turbine engine component as recited in claim 15 wherein said at least one second rare earth element is yttrium.

17. A method of forming an aluminum alloy comprising the steps of:
- a) melting aluminum to a molten state;
 - b) adding approximately 1.0 to 20.0% by weight of a first rare earth element selected from the group consisting of gadolinium and ytterbium;
 - c) forming a plurality of insoluble particles of the first rare earth element;
and
 - d) adding approximately 0.1 to 10.0% by weight of at least one second rare earth element selected from the group consisting of gadolinium, erbium and yttrium if said first rare earth element is ytterbium or the group consisting of ytterbium, erbium and yttrium if said first rare earth element is gadolinium.
18. The method as recited in claim 17 wherein the first rare earth element is ytterbium and said step c includes forming the plurality of insoluble particles of the ytterbium
19. The aluminum alloy as recited in claim 18 wherein the at least one second rare earth element is yttrium.
20. The method as recited in claim 17 wherein the first rare earth element is gadolinium said and step c includes forming the plurality of insoluble particles of the gadolinium
21. The aluminum alloy as recited in claim 20 wherein the at least one second rare earth element is yttrium.
22. The method as recited in claim 16 further comprising the steps of casting the aluminum alloy, solidifying the aluminum alloy and forming the plurality of insoluble particles.

23. The method as recited in claim 22 wherein said step of casting is selected from sand casting, investment casting and die casting.

24. The method as recited in claim 17 further including the step of adding approximately 1.0 to 15% total by weight of at least one minor alloy element.

25. The method as recited in claim 24 wherein the at least one minor alloy element is selected from the group consisting of copper, zinc, silver, magnesium, manganese, tin, titanium, cobalt and calcium.